SCIENCE

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*TEN YEARS OF AMERICAN PSYCHOLOGY: 1892–1902.**

I.

SOME future historian of our science will have a very interesting opportunity to trace and to describe the characterizing features of the so-called 'modern' psychology, and the alleged discoveries made by its devotees. The name of this science and its titular employment in the writing of books are a little bit younger than the discovery of America. It is, perhaps, both too early and too venturesome to suggest that there might be some mystic connection between that name and that historic event. The habilitation of the lore incorporated under that name as a 'science' began just half a century ago. Lotze's 'Medicinische Psychologie' appeared in 1852, and that year must be regarded as the beginning of the new psychological calendar. Some twenty years later Wundt's 'Grundzüge der Physiologische Psychologie' appeared (1874), and about a quarter of a century passed before the first distinct experimental institute for the psychologist had its beginning at Leipzig (1878). After thirty years America had its first laboratory

* A paper prepared for the Eleventh Annual Meeting of the American Psychological Association, December 30, 1902 to January 1, 1903, at Washington, D. C.

(1883). The end of the fourth decennium permits us to see the organization of our association. And the close of the fifth finds us here and now—in full psychological array, shall we say? To the chronicler, at least, the decennia accentuate themselves by reason of the paramount importance of the events which have brought us together.

Our hoped-for historian will probably find himself in a position to point out the importance of these fifty years as residing in their revolutionary results in defining the conception and the method of psychology. Prior to this era, psychology was well regarded as a waif; it was not received by the students of facts, and it was gingerly given a berth by the great chasers after world categories. The revolution which has given us a 'scientific' psychology, the historian will have to say, proceeded in two directions. First, it developed a general type of method, which wrought the great change from a speculative defense of the application of certain theoretical interpretations of every variety of inner experience, to a factual, inductive, measurable, experimental mode of approach to that same experience. The central significance of this change is amply seen in the contrast presented by the fact that modern psychology finds its object is constant with that inner experience—the soul of man remaining the same, so we may assume—but the conclusions of the study of it—how different from the conclusions of any era which has preceded! No less has its influence been exerted in the direction of creating essentially new problems concerning the behavior of mind. Second, it has introduced a basal conception which has shifted from the individualistic, or substantial view of the system builder, to that of the functional, phenomenal view of cosmic evolution, irrespective of the particular formulation given to that idea. Instead of continuing to regard mind as a point of persistent regard with the old psychology, the 'new' has demanded that the 'process' interpretation shall alone be considered fruitful. The revolution in psychological method arose and flourished in Germany; that in conception is the contribution largely of English thinking, which took its definite shape about 1855. The flowering of the former has given us 'experimental' psychology; of the latter, 'genetic' psychology. Such, it seems to me, must be looked upon as the polarization of the psychological thinking which it is given to us to perpetuate or radically to modify.

It may seem to be a piece of venturesome youthfulness and daring jingoism to speak of 'American' psychology, and to define for a science precise boundaries both in space and in time. That this is but a superficial impression is to be seen readily from our desire to emphasize the domestication of the term 'psychology' within our national borders, which has practically—not essentially—occurred within the time limit of the decennium just ended. In the past, American psychology sailed under the terms of 'mental and moral philosophy,' which have even now some fixed and secure anchorages. It, too, was molded chiefly by the theologians, whose line of intellectual descent runs back almost without break to Scottish realism. The good thing in this step-motherly care over psychology consisted in the wholesome fact that that form of speculation attributed a rather definable degree of primacy and reality to human consciousness, which are so fundamental to the genuine psychological attitude. And that was about the only good thing in this theological fostering. That one may venture to speak of an 'American' psychology is to be regarded as a recognition of an undoubted

effort on this side of the Atlantic to renounce our former mode of intellectual dependence upon some foreign system, or upon some old-world thinker. At the same time, no one can be more ready than ourselves loudly to decry jingoism in science. For science, happily, knows no nationality. It is the common heritage, in sharing which no form of social prejudice can despoil us. It is fully possible, however, for the development of a science within a national border to give a definite contribution to the type of life therein growing, and especially is this a hopeful probability the nearer the science approaches the needs of a complete science of man.

The chief justification for our speaking of American psychology is to be found in the fact that our association is just ten years old, and resides in the desire to contribute modestly to the celebration of the decennium by passing in review the work of the association and its influences upon the situation of psychology presented in the United States. Accept the name of our organization, and the adjective in our theme follows as an appropriate sequence. Moreover, it ought to be a good tonic to insist on the value of psychology accruing through the use of the adjective marking nationality.

Inasmuch as the appearance of the American Psychological Association was not a Minerva-like birth, it is proper that a glance should be given to the stock in trade possessed by psychology ten years ago. The state of the science during the decennium preceding the one under review was very satisfactory and encouraging. The gradual influx of its European developments into American thinking took form in a number of definite achievements, which rapidly multiplied in the years to follow. The perfection of exact methods, the adaptation of instruments to test reactions of the simpler order, and the close correlation between the data of cerebral physiology and well-established groups of mental phenomena, tended at first to bring psychological advances into disrepute among those outside its own domain who might have a care for its fortunes, and to gain for these results, in the mouths of theologians and other convenient idealists, the opprobrious epithet of 'materialistic.' The helpfulness of man's self-study for his own development was dangerously neglected in these criticisms, and even the pittance of a culture value to the pursuit of this subject was barely allowed to its chief defenders.

Nevertheless, the decade brought forth noteworthy achievements, both in American scholarship and in American educational institutions. The first American attempt at exact psychological demonstration probably occurred at Harvard in our centennial year. The first laboratory for psychology in America was opened in 1883 by President G. Stanley Hall, as professor of psychology and pedagogy in the Johns Hopkins University. The same year witnessed sporadic efforts here and there to study and to teach something of physiological psychology. The waning of the old and the dawning of the new modes of psychologizing were interestingly marked in three books which appeared in 1886 and 1887: McCosh's 'Psychology: The Cognitive Powers,' Bowne's 'Introduction to Psychological Theory' and Dewey's 'Psychology.' The first tried in a well-intentioned way, at least, to realize the shifting of the center of psychology; the second fought the one-sided materialistic issues of forty years earlier; and the third seriously welded the newer facts of science into the system of absolutism and made psychology a museum of well-balanced definitions. These

imperfect or combative tendencies practically came to their American end in the year 1887, when the *American Journal of Psychology* was founded by President Hall, and Professor George Trumbull Ladd published his 'Elements of Physiological Psychology.' This was the first book to present a careful, synthetic statement of psycho-physical facts in the English language. Through the double reason of their priority in time and their scientific saneness, these two foundations have had the most influence upon the tenor of later American psychology: the one by its emphasis upon research, the other for the academic presentation of the new subject and interpretations of the higher manifestations of mind. For the virtues of a science are largely to be sought in the two directions of original investigation and adequate teaching. The following year, 1888, witnessed the establishment of the first American chair for psychology alone with a laboratory at the University of Pennsylvania, with Professor J. McKeen Cattell in the chair. Here, also, I believe, was given the first instruction in experimental psychology to undergraduate students. Our stock in trade was increased in the two years following by the appearance of Professor J. Mark Baldwin's 'Handbook of Psychology' (first part, 1889), and Professor William James's long-awaited 'The Principles of Psychology' (1890). Here at last came a mighty reinforcement to the psychological impetus, which had been dealing so long in 'first things,' and whose momentum was growing so rapidly; and here came also that added rich flavor which has placed American psychology upon the high pedestal of literary expression, and made it most palatable to the popular mind, while being descriptively in close accord with the facts.

In 1891, our esteemed president began the publication of his splendidly organized and selected work, 'A Laboratory Course in Physiological Psychology.' This second great American step in the adoption of a pedagogical method was sure to be taken, and thus early did a pioneer selective teacher enable the transformed science to take its accredited position among university studies.

In these varied ways of laboratories, chairs and systematic literature, American psychology took on a splendid and resistless form of organization in the universities and colleges, whence radiated the multiple specialties which were developed by those who followed the leadership of these agencies in our higher education. An additional item taken from a more popular gauge of psychological values offers a fitting opportunity to make the contrasts between the psychology that had been and the psychology that was soon to be. The National Educational Association of the United States, at its Toronto meeting in 1891, gave a pinch of attention to experimental psychology. Two round tables, presided over by President Hall, were permitted, but not recognized as a part of the work of the association. The American policy of indebting itself to the Old World continued during these years in the usual double fashion of sending our students abroad for psychological specialization and by bringing in translations of foreign literature. This double mode of our enrichment has placed a blanket mortgage, I fear, upon the stability of the confidence of the American academic administrators in the resources of our own institutions. Certain additional features in the situation ten years ago may be reserved for more fitting mention later.

TEN YEARS INSIDE THE ASSOCIATION.

The increasing objectivity of psychology in America was augmented by the organization of our association in 1892. When the *American Journal of Psychology* moved to the 'Heart of the Commonwealth' of Massachusetts, its editor found himself near the center of things psychological, at least in New England. In the hope of conserving the great gains which had been made for the science, and with the desire of having an exchange where psychological efforts might be pooled and where a more personal and direct mode of checking off results might be available than through the existing channels of publication, President Hall nursed the idea of a society of psychologists, and took counsel by pen and by mouth with many workers in this field. Everybody consulted was in sympathy with the idea, and wanted to become a member of whatever organization might be effected, pledging his hearty cooperation. Fortified and clarified by these preliminaries, including a conference of some length with Professor Ladd, he issued a letter of invitation to more than a score of psychologists to meet at Clark University, on July 8, 1892. A company of men gathered at the appointed time and place, and the preliminary meeting was held, six papers being presented and discussed, and plans projected for a permanent organization. The first annual meeting was held on the 27th and 28th of the December following, at the University of Pennsylvania. Annual meetings have been held in the meantime. The following table presents a summary statement of the features of these meetings, detailing for purposes of ready comparison the items of place, president, election to membership, total membership, attendance of members at each meeting, papers, reports and discussions presented, the number of contributing members and readers not members, research grants, and the treasury balances.*

It is interesting to note that most of the organizing psychologists were interested in the project for the sake of fellowship, friendship and the enjoyment of personality. In reviewing the history of the association, and in attempting to ascertain just what it may have done for its object of advancing the science, we can not simply regard it as a social club, meeting for jolly good times. On the contrary, we must look to the work it has actually accomplished or stimulated and recognized. The annual notice of its meetings sent to its members calls for the title of papers to be read. And to this type of activity our attention must primarily be directed.

I therefore adopted the plan of classifying topically the varied material which has been brought in and given a place at the several meetings, in the form of papers, set discussions and research reports, in order to gather up, in a summary fashion, the actual cooperative achievements within the association. The value of such a summary doubtless depends upon the comprehensiveness of the rubrics selected as representing

* The data are compiled from the reports of the meetings to be found as follows:

'Proceedings of the American Psychological Association.' Macmillan and Co., New York (no date), pp. 29. (Contains accounts of the Preliminary, the First Annual, 1892, and the Second Annual, 1893, meetings.) Third Annual meeting, 1894, in *Psychological Review*, II., 1895, pp. 149–172. Fourth Annual meeting, 1895, in *Psychological Review*, III., 1896, pp. 121–133. Fifth Annual meeting, 1896, in *Psychological Review*, IV., 1897, pp. 107–141. Sixth Annual meeting, 1897, in *Psychological Review*, V., 1898, pp. 145–171. Seventh Annual meeting, 1898, in *Psychological Review*, VI., 1899, pp. 146–179. Eighth Annual meeting, 1899, in *Psychological Review*, VII., 1900, pp. 125–158. Ninth Annual meeting, 1900, in *Psychological Review*, VIII., 1901, pp. 158–186. Tenth Annual meeting, 1901, in *Psychological Review*, IX., 1902, pp. 134–155.

the psychological field. Each psychologist probably has his own pet or changing scheme for dividing the great typical departments of the science as they may appeal to him. I have sought to avoid, in the first instance, such a limitation by following the revised rubrics of 'The Psychological Index,' introduced in 1900, which may be regarded as the latest and perhaps the best existing scheme of division covering that part of the field of psychology which reaches the stage of print. It groups psychological literature under ten chief heads, which are so divided and subdivided as to provide a list of eighty-eight different topics. The following classification of the material available is therefore based on those rubrics. The table includes the presidential addresses and papers presented by title only, but omits the material presented by six persons at the preliminary meeting in 1892 and the general discussions which may have followed any papers.

In preparing such a classification of an enormously varied material, it must be readily confessed that extreme difficulty was often met in deciding the topical properties of a given communication or report. In making the statistical distribution, I have had a special care to represent the themes as faithfully as possible. Special comment must also be made concerning the statistical unit employed in gathering the summary. Such a mode of classification must be based on the equivocal unit derived by making each paper, report or address in a set discussion stand as an integer, becoming the unitary equivalent of every other paper, report or discussion. The amount of psychological material, the expenditure of labor required in its preparation, and the comparative and the net values of its results, either as research or as criticism, represented in this arbitrary unit are completely lost sight of in such a scheme. This is unavoidable. What the table truly represents is the number of times the given psychological topics have been more or less within the focus of the association's attention, and the distribution of these topics throughout the whole field of psychological investigation.

Table I. General Summary of the Meetings of the American Psychological Association.

Meetings.	Preliminary.	First.	Second.	Third.	Fourth	Fifth.	Sixth.	Seventh.	Eighth.	Ninth.	Tenth.
Date.	July 8, 1892.	Dec. 1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.
Place.	Clark Univ.	Univ. of Penn.	Columbia Coll.	Princeton Univ.	Univ. of Penn.	Harvard Univ.	Cornell Univ.	Columbia Univ.	Yale Univ.	Johns Hopkins Univ.	Univ. of Chicago.
President.		G. S. Hall.	G. T. Ladd.	W. James.	J. McK. Cattell.	G. S. Fullerton.	J. M. Baldwin.	H. Münsterberg.	J. Dewey.	J. Jastrow	J. Royce.
Election to membership.	5	11	14	11	11	16	15	13	16	4	7
Total membership.	26	31	42	56	67	78	94	109	122	138	142
Attendance.		18	33	22	23	45	38	51	56	30	30
Papers, etc., presented.	(6)	21	21	24	19	23	37	41	52	25	20
Contributing members.	(6)	10	14	17	17	19	21	26	40	22	18
Non-members contributing.		1		1	1	2		1	1	2	2
Research grants.							$100.00		$50.00		
Treasury balances.		$50.30	$69.50	$127.17	$284.29	$473.54	$669.10	$800.18	$1,097.88	$1,222.58	$1,524.46

Accepting this mode of bunching the work of the ten years, our table offers the following summary. The annual meetings have called forth fifty-six papers on general topics, seven on the nervous system, fifty-three on sensation, thirteen on the characters of consciousness, thirty-four on cognition, two on affection (pleasure and pain being grouped under sensation), seventeen on conation and movement, thirty-nine on the higher manifestations of mind, ten on sleep, trance and pathology, forty-

TABLE II. CLASSIFICATION OF COMMUNICATIONS RECEIVED BY THE AMERICAN PSYCHOLOGICAL ASSOCIATION, 1892–1902.

Rubrics of the *Psychological Index.*	1	2	3	4	5	6	7	8	9	10	Tot.	%'s
I. General											**56**	20—
1. Text-Books and Systematic Treatises												
2. General Problems, Methods, Terms and Apparatus	6	5	4	1	3	4	7	11	5	1	47	
3. History and Biography	1			1	1	2		1	3		9	
4. Collections, Proceedings, Dictionaries and Bibliographies.												
II. Anatomy and Physiology of the Nervous System											7	3—
1. General												
2. Nerve Elements												
3. Brain and its Functions												
a. Anatomy of the Brain												
b. Physiology of the Brain					1	1	1		1		4	
4. Spinal Cord, Nerves and Sympathetic System												
5. Reflex and Automatic Functions				1		1	1				3	
6. Pathological Anatomy												
III. Sensation											**53**	19—
1. General; Synæsthesia					1	1	1	1			4	
2. Sense Organs (General)												
3. Psycho-physics (Weber's Law, etc.)	1				1	3	1				6	
4. Psychometry	3	2	1								6	
5. Vision and Ocular Motor Functions												
a. General												
b. Anatomy and General Physiology of the Eye												
c. Physics and Special Physiology of Vision			1			2	3	1			7	
d. Visual Sensations			1	1							2	
e. After-Images, Contrast, etc		2				1	1				4	
f. Eye Movements and Binocular Vision								3	1		4	
g. General Pathology of Vision												
6. Hearing												
a. General												
b. Anatomy of the Ear												
c. Physics and Physiology of Hearing												
d. Auditory Sensations								1		1	2	
e. General Pathology of Hearing												
7. Other Senses												
a. Taste and Smell			1				1				2	
b. Cutaneous, Pressure and Joint	2	1			1	1					5	
c. Muscle Sense and Muscles		1	1								2	
d. Static Sense, Position, Equilibrium, Dizziness												
e. General Sensibility, Organic Pleasure and Pain Senses.	1	2	5				1				9	
8. General Pathology of Sensation												
IV. Characters of Consciousness											**13**	4+
1. General								1			1	
2. Attention, Apperception, Selection						1	1			1	3	
3. Association												
4. Habit, Accommodation, Adaptation						3					3	
5. Work and Fatigue	1					1		1		1	4	
6. Time Relations of Consciousness				1						1	2	
V. Cognition											**34**	12+
1. General			1				1				2	
2. Perception and Idea; Reading		1		1		1				1	4	
3. Perception of Time, Space and Motion		1				1			1		3	
4. Memory and Imagination	1	1	1		1		1			1	6	
5. Judgment and Belief; Reasoning	1					1	4			1	7	
6. Reflection and Self-Consciousness			1		1	1	1		1		5	
7. Normal Illusions and Normal Suggestion	1		1	1		2	1			1	7	
8. General Pathology of Cognition												
VI. Affection (Feeling and Emotion)											**2**	1—
1. General; Pleasantness and Unpleasantness												
2. Emotion and its Expression			1						1		2	
3. General Pathology and Feeling												
VII. Conation and Movement											**17**	6+
1. General; Dynamogenesis and Inhibition								1			1	
2. Organs of Movement												
3. Instinct and Impulse (Imitation, Play, etc.)			1				2				3	
4. Special Motor Functions												
a. Language and Song							1	2			3	
b. Handwriting and Drawing									1		1	
c. Walking												
d. Other Motor Functions							1	2		1	4	
5. Volition and Effort				1				1	1		3	
6. Freedom of the Will			1					1			2	
7. General Motor Pathology												
VIII. Higher Manifestations of Mind											**59**	14—
1. Logic and Science; Methodology				1	3			2	3	2	11	
2. Ideals and Values												
3. Theory of Knowledge					1	1		4	1	1	8	
4. Æsthetics	1						1	1		1	4	
5. Ethics					2		3	2	2	1	10	
6. Religion						1		3		2	6	
IX. Sleep, Trance and Pathology											**10**	3+
1. Sleep and Dreams	1	1		2		2					6	
2. Hypnosis and Trance States												
3. Psychical Research												
4. Pathology; General Discussion									1		1	

TABLE II. CLASSIFICATION OF COMMUNICATIONS RECEIVED BY THE AMERICAN PSYCHOLOGICAL ASSOCIATION, 1892–1902.—*Continued.*

Rubrics of the *Psychological Index.*	1	2	3	4	5	6	7	8	9	10	Tot.	%'s
5. Nervous Diseases												
a. General						1					1	
b. Neurasthenia and General Paralysis												
c. Epilepsy and Hysteria												
d. Other Neuroses												
6. Mental Disease												
a. General (Insanity)												
b. Idiocy, Imbecility, etc												
c. Other Special Psychoses					1		1				2	
7. Medical Jurisprudence												
X. Genetic, Individual and Social Psychology											41	14+
1. Evolution and Heredity		1			1	1	–			1	4	
2. Comparative Psychology			1	1	1		1	1	1	1	7	
3. Mental Development				6			1				7	
a. General; Adolescence and Senescence												
b. Child Psychology		1			1			2			4	
c. Pedagogy							2	5			7	
4. Individual, Sex and Class Psychology		1	2	1				5	2		11	
5. Folk Psychology												
6. Social Psychology												
7. Race Psychology					1						1	
a. Criminology												
b. Degeneration												
Physical and Mental Test Reports (not included above)	1	1			2	4	2			1	11	4–
Totals	21	21	24	19	23	37	41	52	25	20	283	100

one on genetic, individual and social psychology and eleven reports on physical and mental tests, making an aggregate of two hundred and eighty-three communications the association has received. Thirty-eight of the eighty-eight topics listed by 'The Psychological Index' have remained barren throughout the ten years, not having received a single notice. They comprise almost one half of the whole field so listed, showing a rather surprising lack of breadth of treatment. It should be observed, however, that these topics are largely pathological in scope. It is unnecessary here to recount these special topics, which are readily traced in the table.

If one wishes to ascertain the points emphasized in the work of the association thus represented, and learn what have been the lines of dominant interest expressing themselves, he may take numbers as indicative thereof. Arranged in the order beginning with the maximum and ending with the minimum, the summary shows the following results, of course presupposing that all the material has been of a distinctly psychological character: General (56), sensation (53), genetic, social and individual psychology (41), higher manifestation of mind (39), cognition (34), conation and movement (17), characters of consciousness (13), mental tests (11), sleep, trance and pathology (10), anatomy and physiology of the nervous system (7), affection (2).

This topical arrangement offers only the advantages of a cross-section view of the ten years, and is, therefore, inadequate to point out the more interesting perspective of the drifts and tendencies which may be taken to mark the ups and downs of interest in so far as they may have been evoked by the association. I have, therefore, redistributed the material under such rubrics as, it seems to me, more adequately point out the methods, types of interest, and perhaps results, which are what we chiefly seek in the historical way. The selection of the headings employed in Table III., such as 'historical,' 'theoretical,' 'descriptive,' 'experimental,' etc., must be left to justify itself. It need scarcely be added that in the preparation of this table, as was the case in the preceding table, recurring difficulty was encountered in tabbing off a paper under this topic, or under

that; but the sanity of the distribution may safely be left to him who is ready to wade through the material for himself. The possible modification of the results thus obtained through the qualities of our arbitrary unit must also not be overlooked.

edly philosophical. The last two meetings indicate a noticeable diminution of interest and activity in all these directions, except possibly that of the philosophical group. Only two meetings, the seventh and the eighth, have brought forth something in

TABLE III.

Type of Communication.	(At the preliminary meeting six members presented papers, of which there are no details.)	First.	Second.	Third.	Fourth.	Fifth.	Sixth.	Seventh.	Eighth.	Ninth.	Tenth.	Totals.	Percentages.
Historical		1			1		2	1	3	3	1	12	4+
Theoretical			4	6	2	2	2	1	6	1	1	25	9—
Descriptive			2	1	1	1	2	9	4	1	2	23	8+
Experimental		12	9	8	6	5	17	11	10	4	4	86	30+
Comparative				1	1	1		1	1	1	1	7	3—
Genetic			2	2	6	1	1	4	5	1	3	25	9—
Pieces of apparatus shown or described		1	2	3		1	3	6	7	4	1	28	10—
Physical and physiological		5	1	2	1	1	4	3	1	2		20	7+
Pedagogy and the application of psychology				1		2	2	1	5		1	12	4+
Philosophical		1			1	8	2	2	8	7	5	34	12+
Discussions with the naturalists						1	1	1	1			4	1+
Miscellaneous		1	1	(5)*			1	1	1	1	1	7	3—
Totals		21	21	24	19	23	37	41	52	25	20	283	
Percentages		7+	7+	8+	7—	8+	14—	15—	18+	9—	7+		100

* Five papers were offered, but not read, nor mentioned by title.

Resorting again to a statistical indication of the type of psychologizing developed under the sponsorship of the association, we find this summary presenting the following scale of interests. In ten years the association has countenanced eighty-six items of an experimental character, thirty-four philosophical, twenty-eight on apparatus, twenty-five theoretical, twenty-five genetic, twenty-three descriptive, twenty physical and physiological, twelve historical, twelve pedagogical, seven comparative, seven miscellaneous and four discussions outside. A detailed study of this table shows some interesting contrasts, which the reader can not fail to detect. Attention may be called to some of them. The first, sixth, second, third, seventh and eighth meetings have been predominantly experimental in the order named. The fifth and ninth meetings have been mark-

every direction. The pedagogical interests of the science have had the smallest distribution, having been in evidence at only six meetings. In spite of the apparently shifting interests, the association may claim for itself a scientific and inductive character. Forty per cent. of the material belongs to the experimental and apparatus items alone. And more than eleven per cent. properly contributes to the developmental point of view.

Not to undertake a discussion of the contributive values of the papers to the growth of the science is a restriction we have placed upon this historical survey, and the relative merits of the contributions made under each heading we refrain from discussing, except the one instance of the presidential addresses, to which we now turn.

THE PRESIDENTIAL ADDRESSES.

The ten presidential addresses delivered before the association, which have been included as so many units in the general summaries above, are interesting enough for separate note. These reviews and discussions of our psychological nestors may well be regarded—at least be expected to be so—as indicating the high-water mark reached by the psychological tides in the ebb and flow of the years. They are, in truth, made up of congratulations, instructions and warnings to psychology. There have been ten of them; hence their mere numerical evaluation can count for but little. Four men, Presidents Hall, Ladd, Cattell and Jastrow, have reviewed the history, progress, present position and the prospects of psychology; while six, Presidents James, Fullerton, Baldwin, Münsterberg, Dewey and Royce, have specialized in the problems they presented. Four of the latter, oddly enough, have allowed their presidential thoughts to center around certain cognitive problems of the intellect. One address was expressly devoted to the ontological differentiations between 'Psychology and History.' And, finally, only one address of the ten attempted *in extenso* to make good the claim that psychology has manifest and manifold practical applications, which occurred under terms of 'Psychology and Social Practice,' the special form of social practice considered being education.

It is not a little interesting to see how hard it is for the psychologists *von Fach* to keep from trespassing on the green fields of epistemology and metaphysics. The borderland between the scientific and the speculative interests has not only been wandered over, but there have been technical discussions of the latter. This appears unquestionably in such themes as 'The Knowing of Things Together,' 'The Self in its Function of Knower,' 'Recent Logical Inquiries and their Psychological Bearings.' Six presidents dwelt upon the relation between psychology and philosophy, some at length, but all approvingly, including one who has stood most stoutly and clearly for the development of exact, quantitative results in the laboratory. Thus the majority have either affirmed in general or illustratively detailed the interdependent relation between this new science and the old love of reason.

It is disappointing to discover in the scope of these addresses that only three presidents have dealt with the laboratory field of problems, the scope and the conditions of the psychological experiment and the relations of statistical and experimental studies of mind to the total science of psychology. Not even the experimentalist presidents—professionally such, of whom there have been at least three, and at most six—have improved the presidential occasion for giving greater momentum and needed clarity to the experimental development of the science. Where prejudice against the method might have been supposed to exist there has been the greater generosity in recognizing it; and where passion for the method should have existed, there has been actual default in the use made of the opportunity.

One half of the presidents have treated of purely formal, theoretical or speculative interests. Two have supported the genetic method and attempted to vindicate the bearing of the conception of evolution on the problems, methods and attitudes of psychology. Only one has suggested the psychological values of abnormal and decadent experience, while none has dealt with the feelings.

Six presidents have been content to look backwards, or to feel certain only up to the present; while not more than four have looked forward and suggested new prob-

lems or other constructive work which would tend to strengthen the science among the sciences and in the esteem of those who mold our educational and national life. The practical aspects of our science, its values in the conduct of life and its direct bearings in education, medicine, treatment of the unfortunates and in social reforms, its influence upon the development of other sciences, such as biology, anthropology, sociology, logic and ethics, and its aid in the pursuit of art, history and literature, have been clearly affirmed by five presidents, denied by one, and practically ignored by the rest. Only one, I believe, has seriously touched the question of the teaching of psychology to our student body. Which type of a president derived by compositing all these contrasts is the more desirable and the more useful in our leadership in view of the present needs of psychology, is a query that must be referred to each one by himself.

THE MEMBERSHIP.

The structure of an association organized in the interest of the advancement of science finds its efficiency not so much in the cortical officials who annually declare their views, as in the interest and efforts of its members, who actively explore the psychological field, offer intelligent criticism of past returns, and otherwise increase its content of fact and in general advance its repute. The scientific and professional aims of the association have been safeguarded within itself, at least, by that modern form of predestination which makes the psychologist's 'calling and election sure.' We have already given an impersonal summary of the work yielded by the elect. We have yet to consider its distribution among the individuals. The fourth, fifth, sixth, seventh and eighth headings in Table I. present the aggregate facts to be considered in detail.

Beginning with twenty-six original members, the association has grown annually, having admitted in the ten years one hundred and forty men and eight women to membership. One man has been elected twice to membership, and seven of the women abide with us still. The present roll includes one hundred and twenty-seven names, showing a total loss, by death and voluntary cessation, of twenty-one members during the ten years. In the matter of attendance, the showing is not as satisfactory as one would wish for the efficiency of the association. The average attendance of members at each meeting has been nearly thirty-five, which is but slightly above the membership at the first annual meeting. Reasons geographical and financial, not to mention others more temporary or personal, must not be overlooked in interpreting for psychology's fellowship, the percentage the attendance at each meeting has been of the total elections indicated above. It is, however, in place to ask, why has the association apparently lost its hold upon our psychological nestors, who have seemed ready to give place to the younger men? This may indicate a lack of interest on their part in the scientific details that legitimately find place in the proceedings, or it may betoken a change in the community of interest in the unified development of inquiry and criticism. Psychologists above all others are least apt to misinterpret the significance of mere numbers, popularity or enthusiasm. But those who wield greater influence in shaping the association's affairs can well take into consideration the causes of the lessening grip upon many of the more mature and industrious of our coworkers, and seek to promote the faith within ourselves.

The most noticeable feature in the comparative exhibit in Table I. is the contrast

between the steady increase in membership and the absence of any marked deviation in the number of members who have contributed to the material of the association, excepting at the eighth annual meeting. This is all the more striking in view of the fact that the association receives communications 'by title,' and these are relatively few in number. The average attendance at the annual meetings is almost thirty-five. The average number annually elected to membership is almost twelve. But the average number of contributing members is only about twenty, a number which remains well-nigh constant.

A more forceful, and thus a more interesting, way of showing the aggregate individual distribution of the industry that has found place among us annually is given in the following summary, which includes two or three instances of joint authorship. Eighty-nine members have been the total contributors, of whom thirty-four have presented one unit, as paper, report, etc., each; twenty-three have presented two units each; ten have presented three each; eight have presented four each; five have presented five each; three have presented six each; two have presented seven each; one member has presented fourteen, one seventeen, one nineteen and one twenty-three units.

The remaining fifty-nine members have been inactive, *silently* paying their annual dues. It is, indeed, a serious question whether the association can hasten its realizations by carrying forty per cent. empty baggage, or whether this phase of the situation should not be radically changed. Almost twenty-six per cent. of the total contributions offered has been the work of four members, who are laboratory men. It will not be overlooked that they have simply stood as sponsors mostly for the work done by the student body of researchers working under their direction. No one would, of course, give an unequivocal sanction to much speaking as a psychological test. But such a summary shows the lines of inevitable fruitfulness.

Again the inevitable query bears in upon us: What of the value of the material which has been thus variously presented from time to time? But we must continue to set it aside. If one attempts to judge its worth, and the advance of science through its worth, he runs into the danger of maintaining that the field over which we have trod remains *sub judice*. And, moreover, it might reveal an immodest immaturity, to say the least, should one attempt to anticipate our psychological posterity in its function of judging of the offerings which have been brought hither year by year.

There is one function which the association can properly undertake more seriously, which would tend to secure a steady advance in the value of the newer material psychological researches may bring forth. At present the indefinite and uncertain method of 'natural selection' or mere survival of interest in individual cases is the only mode of checking off results. An improvement over this method would be a planful arrangement whereby the association could see to it that the annual output of new conclusions and formulæ is intelligently and critically evaluated. This would effect a great saving of individual labor on the part of each psychologist.

Edward Franklin Buchner.
University of Alabama.

(To be continued.)

Professor Alexander Graham Bell on Kite-Construction.

It is fortunate for those interested in aeronautics and the exploration of the air

that Professor Alexander Graham Bell has joined the band of experimenters and is lending his inventive genius to the cause. Professor Bell has been for several years experimenting with kites, led to this line of experiments, he thinks, because of the intimate connection of the subject with the problem of the flying machine.* Professor Bell began his experiments with the box-kite of Hargrave, whom he recognizes as the pioneer in modern kite-construction. His objections to the box-kite are that, "It requires additions to the framework of various sorts to give it sufficient strength to hold the aeroplane surfaces in their proper relations and prevent distortions of the kite-frame under the action of the wind. Unfortunately the additions required to give rigidity to the framework all detract from the efficiency of the kite: first, by rendering the kite heavier, so that the ratio of weight to surface is increased; and, secondly, by increasing the head-resistance of the kite. A rectangular cell like *A* (Fig. 1)† is structurally weak, as can readily be demonstrated by the little force required to distort it into the form shown at *B*. In order to remedy this weakness, internal bracing is advisable of the character shown at *C*. This internal bracing, even if made of the finest wire, so as to be insignificant in weight, all comes in the way of the wind, increasing the head-resistance without counterbalancing advantages."

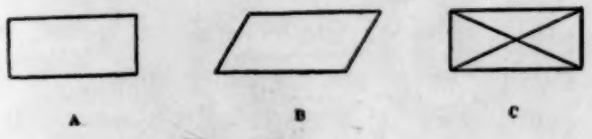

FIG. 1.

These remarks of Professor Bell concerning guys, etc., do not apply to the original Hargrave kites which have no guys, but only to a style of Hargrave kite invented and patented by me. This style is the one which has come into universal use under the name of the Hargrave kite, and is the one with which Professor Bell began his experiments rather than with the original Hargrave structure, few of which have been made.

FIG. 2.

Continuing, Professor Bell says: "In looking back over the line of experiments in my own laboratory I recognize that the adoption of a triangular cell was a step in advance, constituting indeed one of the milestones of progress, one of the points that stand out clearly against the hazy background of multitudinous details. The following (Fig. 2) is a drawing of a typical, triangular-celled kite, made upon the same model as the Hargrave box kite. * * * A triangle is by its very structure perfectly braced in its own plane, and in a triangular-celled kite, like that shown in Fig. 2, internal bracing of any kind is unnecessary to prevent distortion of a kind analogous to that referred to above in the case of the Hargrave rectangular cell (Fig. 1). The lifting power of such a triangular cell is probably less than that

* His experiments are described in a communication made to the National Academy of Sciences, in Washington, D. C., April 23, 1903. Also *National Geographical Magazine* for June, 1903.

† The numbers of the figures differ from the original because many of the figures are omitted here.

of a rectangular cell, but the enormous gain in structural strength, together with the reduction of head-resistance and weight due to the omission of internal bracing, counterbalances any possible deficiency in this respect.''*

''Triangular cells also are admirably adapted for combination into a compound structure, in which the aeroplane surfaces do not interfere with one another. For example, three triangular-celled kites, tied together at the corners, form a compound

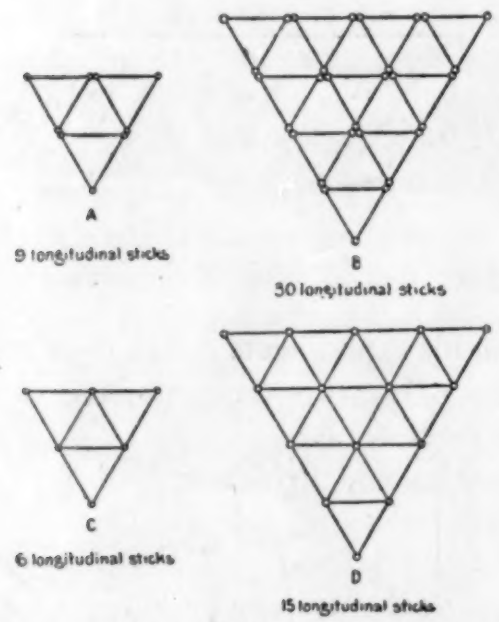

Fig. 3.

cellular kite (Fig. 3, *A*) which flies perfectly well. The weight of the compound kite is the sum of the weights of the three kites of which it is composed, and the total aeroplane surface is the sum of the surfaces of the three kites. The ratio of weight to surface, therefore, is the same in the larger compound kite as in the smaller constituent kites, considered individually.

''It is obvious that in compound kites of this character the doubling of the longitudinal sticks where the corners of adjoining kites come together is an unnecessary feature of the combination, for it is easy to construct the compound kite so that one longitudinal stick shall be substituted for the duplicate sticks. For example: the compound kites *A* and *B* (Fig. 3) may be constructed, as shown at *C* and *D*, with advantage, for the weight of the compound kite is thus reduced without loss of structural strength. In this case, the weight of the compound kite is *less* than the sum of the weight of the component kites, while the surface remains the same. If kites could only be successfully compounded in this way indefinitely, we should have the curious result that the ratio of weight to surface would diminish with each increase in the size of the compound kite. Unfortunately, however, the conditions of stable flight demand a considerable space between the front and rear sets of cells; and, if we increase the diameter of our compound structure without increasing the length of this space, we injure the flying qualities of our kite. But every increase of this space in the fore and aft direction involves a corresponding increase in the length of the empty framework required to span it, thus adding dead load to the kite and increasing the ratio of weight to surface.

''While kites with triangular cells are strong in a transverse direction (from side to side), they are structurally weak in the longitudinal direction (fore and aft), for in this direction the kite frames are rectangular. Each side of the kite *A*, for example, requires diagonal bracing of the

* Some experiments, made by us at Blue Hill in 1896 with some of Hargrave's models of triangular-celled kite, led us to think the rectangular cell much superior in efficiency to the triangle, owing to the sheltering of the upper surface at the corners of the triangular-celled kite.

character shown at *B*, in which the framework forms the outline of a tetrahedron. In this case the aeroplanes are triangular, and the whole arrangement is strongly suggestive of a pair of bird's wings raised at an angle and connected together tip to tip by a cross bar.

"In the tetrahedral kites, shown in the plate (Figs. 4 and 5), the compound structure has, itself, in each case the form of the regular tetrahedron, and there is no reason why this principle of combination should not be applied indefinitely so as to form

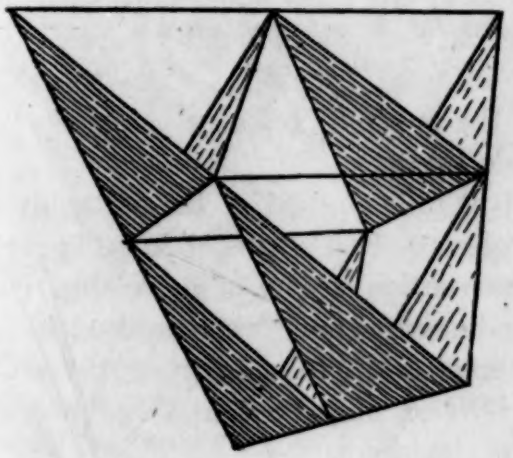

FIG. 4. Four-celled tetrahedral kite.

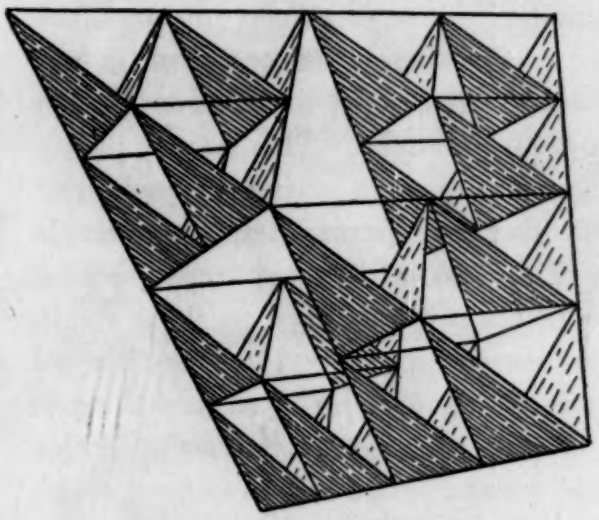

FIG. 5. Sixteen-celled tetrahedral kite.

still greater combinations. The weight relative to the wing-surface remains the same, however large the compound kite may be. The four-celled kite (Fig. 4), for example, weighs four times as much as one cell and has four times as much wing surface.

"This, at first sight, appears to be somewhat inconsistent with certain mathematical conclusions announced by Professor Simon Newcomb in an article entitled, 'Is the Air-ship Coming?' published in *McClure's Magazine* for September, 1901—conclusions which led him to believe that 'the construction of an aerial vehicle which would carry even a single man from place to place at pleasure requires the discovery of some new metal or some new force.' The process of reasoning by which Professor Newcomb arrived at this remarkable result is undoubtedly correct. His conclusion, however, is open to question because he has drawn a general conclusion from restricted premises.

"He says: 'Let us make two flying machines exactly alike, only make one on double the scale of the other in all of its dimensions. We all know that the volume, and therefore the weight, of two similar bodies are proportional to the cubes of their dimensions. The cube of two is eight: hence the larger machine will have eight times the weight of the other. But surfaces are as the square of the dimensions. The square of two is four. The heavier machine will therefore expose only four times the wing surface to the air, and so will have a distinct disadvantage in the ratio of efficiency to weight.

"But Professor Newcomb's results are probably only true when restricted to his premises. For models *exactly alike, only differing in the scale of their dimensions,* his conclusions are undoubtedly sound; but where large kites are formed by the multiplication of smaller kites into a cellular structure the results are very different."

The experiments on kites at Blue Hill have led me to the conclusion that the conditions which confront the experimenter are not so favorable as suggested by Professor Bell, nor so hard as suggested by Professor Newcomb.

I made some experiments in 1898 with a compound kite built up of a number of small rectangular kites such as are called the Blue Hill Naval Kites. In addition to the necessity of giving greater space between the cells with increasing size, I found two other difficulties: (1) When several small kites are combined into one, the pull of all the kites is concentrated on certain points which need to be strengthened by using larger sticks. This may be partly overcome by tying a string to each unit and bringing the separate strings to a single flying line at some distance from the kite. But in such a case there is a crushing strain on the central units due to the inward pressure of the outer units, so that the kite must be strengthened by trusses or larger sticks if the compound kite is to fly through the same range of wind-velocity as the unit. (2) When a compound kite strikes the ground the unit which first reaches the ground has above it the combined weight of all the other units and is instantly crushed in conditions where the unit flying alone would not have been injured in the slightest. This effect was so serious an objection that it led me to abandon the effort to build a compound kite out of units.

On the other hand, the weight of kites built on the same model does not increase so fast in practice as Professor Newcomb's law implies. The experience at Blue Hill is that if one can build a kite four feet high sufficiently strong for practical work, and it weighs one and one half ounces per square foot, then one can build a similar kite eight feet high which will weigh two ounces per square foot and be sufficiently strong for practical work. Mr. C. H. Lamson built a kite thirty feet high with two cells similar to the kites used at Blue Hill, and it weighed only about four ounces per square foot. This kite easily lifted a young man weighing about 130 pounds into the air, and, unloaded, flew beautifully in a wind of fifteen to twenty miles an hour, as witnessed by Mr. A. L. Rotch, Mr. S. P. Fergusson and myself.

The reason of this departure from Professor Newcomb's law is that only the sticks of the kites increase in size (and the necessity of this is usually partly overcome by internal bracing), while the thickness of the surfaces remains the same through wide limits.

But independent of these considerations, Professor Bell's principle of tetrahedral construction seems a promising one and further experiments are awaited with much interest, while the structure he has already developed may be found of great use by experimenters.

H. H. Clayton.

Blue Hill Observatory.

SCIENTIFIC BOOKS.

The Rôle of Diffusion and Osmotic Pressure in Plants. By Burton Edward Livingston, of the Department of Botany. The Decennial Publications, Second Series, Volume VIII., Chicago. The University of Chicago Press. 1902. 8vo. Pp. xiv + 150.

As stated in the preface: "The present volume will deal with the past and present of diffusion and osmotic pressure from the standpoint of plant physiology. It has a double *raison d'être*. First, it was felt that there was need of some direct and not too exhaustive account of the essential physical facts and theories of the subject. The interest of the physical chemist here has lain mainly in the light which these phenomena have been able to throw upon the ultimate nature of matter and upon electrolytic proc-

esses. It has thus been difficult for the student of physiology who is not at the same time well versed in physical chemistry to obtain the information required for the prosecution of work in this field. Secondly, it seemed desirable to bring together in a general review the literature of this subject in its biological aspects, so that the promising and unpromising points for future research might become more apparent."

Opening the book, we find that it consists of two parts; the first of forty-eight pages devoted to 'Physical Considerations.' This includes what are properly physical discussions. There is first a discussion of matter in its several states, and this is followed by a chapter on diffusion and diffusion tension.

The third chapter is devoted to 'Liquid Solutions,' the fourth to 'Ionization' and the fifth and sixth to 'Osmotic Phenomena.' In the treatment no attempt has been made to be exhaustive. Only certain aspects of the present conceptions of these matters among physicists and chemists are discussed, and their discussion is presented with the aim of clearing the way for the physiological discussions which make up the body of the book. The author especially disclaims any originality in this portion of his book, but it must be said that he has done a very great service to botanical science by making available here, for the first time, a summary treatment of these physical phenomena.

Part II. is devoted to 'Physiological Considerations,' and here in about one hundred pages the botanist will find some important discussions. The author first takes up 'Turgidity,' and follows this with a discussion of 'Absorption and Transmission of Water and Solutes,' 'The Influence of Osmotic Pressure on Organisms.' The treatment is eminently satisfactory and will prove to be very helpful to the physiological student. To show the range of the discussion in the book we may quote from the author's summary at the close of the book as follows:

> As far as investigation has gone, it has been found that growth is accelerated in weak solutions and retarded in concentrated ones. The term 'growth' here includes, not only enlargement, but also the process of cell division. Also, in some cases at least, the direction of new walls is profoundly influenced by the concentration of the surrounding medium. In general, all vital processes are retarded in concentrated solutions. Reproduction, being a peculiar form of cell division, appears in some cases to be entirely dependent upon the osmotic pressure of the surrounding medium. Irritability is also greatly influenced by external pressure. Not only is this function retarded in concentrated solutions, but in some forms the direction of response to a given stimulus may be reversed by a sudden change in the osmotic surroundings. The comparative concentration of the external and internal solutions acts, in many cases, as a stimulus upon the organism, giving rise to the phenomena of osmotaxis.
>
> All the effects of high concentration of the surrounding liquid seem to be due to extraction of water from the living cells. They may be due either to a drying-out process or to decrease in turgidity. That they are sometimes due to the former is proved by curious analogies between the various processes which extract water from the protoplasm. Whether or not this extraction of water from the protoplasm itself is the direct cause of the responses to concentrated solutions, is not yet known. The effect may be a chemical one, due to the increased concentration of the contained solutions.

This book will at once take its place as a standard work in all institutions where any attention is given to plant physiology.

CHARLES E. BESSEY.
THE UNIVERSITY OF NEBRASKA.

SCIENTIFIC JOURNALS AND ARTICLES.

THE AMERICAN JOURNAL OF ANATOMY, VOL. II., NUMBER 3. JULY, 1903.

A. M. MILLER: 'The Development of the Post-caval Vein in Birds,' pp. 283–299, with 10 Text-figs.

G. L. STREETER: 'Anatomy of the Floor of the Fourth Ventricle,' pp. 299–315, with 4 Plates and 2 Text-figs.

F. P. MALL: 'The Circulation through the Pulp of the Dog's Spleen,' pp. 315–333, with 1 Plate and 1 Text-fig.

F. P. MALL: 'The Transitory or Artificial Fissures of the Human Cerebrum,' pp. 333–341, with 1 Table.

A. J. CARLSON: 'Changes in the Nissl's Substance of Nerve Cells of the Retina of the Cormo-

rant, during Prolonged Normal Stimulation,' pp. 341–349, with 1 colored Plate.

R. H. Whitehead: 'A Study of the Histogenesis of the Adrenal in the Pig,' pp. 349–361, with 6 Text-figs.

E. L. Mellus: 'On a Hitherto Undescribed Nucleus Lateral to the Fasciculus Solitarius,' pp. 361–365, with 3 Text-figs.

Katherine Foot and E. C. Strobell: 'The Sperm Centrosome and Aster of *Allolobophora foetida*,' pp. 365–371, with 1 Plate.

C. F. W. McClure: 'Contribution to the Anatomy and Development of the Venous System in *Didelphys marsupialis* (L.)—Part I., Anatomy,' pp. 371–405, with 5 colored Plates and 11 Text-figs.

W. H. Lewis: 'Wandering Pigment Cells Arising from the Epithelium of the Optic Cup, with the Development of the M. Sphincter Pupillæ in the Chick,' pp. 405–417, with 15 Text-figs.

SOCIETIES AND ACADEMIES.

BIOLOGICAL SOCIETY OF ST. LOUIS.

The Biological Society of St. Louis was organized March 3, 1903. Dr. A. W. Greeley was elected president. The membership numbers about fifteen at present and increases at each meeting. It speaks well for the future of the society that the present membership is exceptionally homogeneous and harmonious, and that a place is rarely vacant at the meetings.

Although but four meetings have been held, and the society is yet in the formative stage, gratifying progress has been made. Current literature in botany, zoology and physiology has been reviewed. Several of the reviews have been given by members whose personal and professional relations with the authors gave to the reviews an unusual interest. Considerable original work will doubtless be presented during the next year.

At present steps are being taken looking toward closer relations with the Academy of Science of St. Louis. The meetings of the society are held on the last Tuesday evening of the year excepting in the months of June, July and August. Visiting biologists are cordially invited to attend.

W. L. Eikenberry,
Secretary.

St. Louis, Mo.

DISCUSSION AND CORRESPONDENCE.

THE ADVANTAGES OF THE GOVERNMENT CINCHONA PLANTATION IN JAMAICA AS A TROPICAL BOTANICAL STATION.

In a month's residence this spring, at Cinchona, during which time I was daily occupied in field work within a radius not greater than ten miles from the Cinchona garden, I was much impressed with the advantages of this location for a permanent tropical botanical station in America. After conversation and correspondence with botanists who have worked in this and various other tropical regions, I have become thoroughly convinced that, for such a station, no other location combines the many superior advantages of Cinchona.

A luxuriant and varied flora to meet the diverse demands of American botanists wishing to work on problems of distribution, development or physiology of tropical plants is, of course, the first requisite of a locality proposed for such a station. Associated with the extremely varied physiographic and climatic characters of the region accessible from Cinchona is a flora which makes this location preeminently advantageous for botanical work.

Cinchona is on a hill which forms a spur projecting southward from the Blue Mountain Range. Within three miles of Cinchona, in the Blue Mountains, is the well-known Morce's Gap, through which moisture-bringing clouds drift almost continuously, thus giving rise, near the Gap, to a dense and greatly varied vegetation especially rich in lichens, bryophytes and pteridophytes. In the deep valley of the Mabess River, just north of this, the vegetation is even more luxuriant than about the gap itself. Other moist gaps, many high mountain peaks and several deep river valleys directly below Cinchona Hill have a luxuriant plant covering of mesophytic type. Nearer Cinchona are the more xerophytic foothills of the Blue Mountains, and below these are the still drier plains about Kingston. These different regions, to reach the most distant of which requires not more than a two-day trip from Cinchona, afford a complete series of moisture conditions and plant

formations ranging from the broom of Cinchona Hill to the dildoes and *Melocactus* of Port Henderson. Cinchona thus possesses the chief requisite for a botanical station in the abundance and variety of its flora. There are also numerous and important accessory advantages of an even more exceptional nature.

The accessibility of Jamaica makes it a most desirable location for a botanical station. Six to ten steamers each week land passengers at Port Antonio or Kingston, and from either of these places Cinchona can be reached readily in ten or twelve hours of delightful travel by train, carriage and saddle. No other portion of tropical America has as fine a system of carriage roads in the lower country, and bridle paths in the mountain regions, as has Jamaica. To the collecting grounds about Cinchona one can walk or ride, in all directions, upon well-graded and well-drained mule paths. These paths lead to the thickets of Blue Mountain Peak, the dense forests of Mabess, the dry hills and the fertile bottoms of the Clyde, Yallahs and Hope valleys.

The stable government and efficient police system which make life and property secure are an advantage possessed by Jamaica over many tropical countries. The use of the English language throughout the island is a very evident advantage to the transient resident. As a consequence of superior political conditions, we find here government gardens, with corps of resident trained botanists familiar with the flora and very courteous in offering aid, which may prove invaluable to a worker on his introduction to the island. The government gardens are valuable adjuncts to the native flora in furnishing material of many exotics growing under practically normal conditions. In this connection it should be remembered that at Cinchona itself is an extensive garden with greenhouses containing many native and exotic temperate plants. There is also here a series of buildings which can readily be made to fill all the requirements of a tropical botanical station. Such an equipment, I believe, is not to be found in any other available location.

Health conditions at Cinchona, which is 5,000 feet above sea level, are most favorable, and the botanist is, therefore, not liable to be prevented by physical disability from taking fullest advantage of the excellent opportunities for botanical work. Malarial troubles are unknown, and the many dangers to health, so frequent in tropical regions, are here absent. Food in sufficient quantity and variety and pure drinking water from the source of the Clyde River are readily obtained. Moderate temperatures, ranging from 50° to 80°, prevail throughout the year, and the climate is stimulating to physical and mental effort.

DUNCAN S. JOHNSON.
JOHNS HOPKINS UNIVERSITY.

SHORTER ARTICLES.

THE STRATIGRAPHIC POSITION OF THE JUDITH RIVER BEDS AND THEIR CORRELATION WITH THE BELLY RIVER BEDS.*

THE readers of SCIENCE will recall that during last winter and spring a discussion was carried on in its pages concerning the age and relationships of the formations mentioned in the title of this note. This discussion, which was provoked by the publication of Osborn and Lamb's paper on the vertebrate fossils of the Belly River beds, was participated in by Messrs. Hatcher, Stanton, Osborn and Williston.

Since June 1 the undersigned have been engaged in an investigation of this subject in the field, and have reached some definite conclusions which are deemed worthy of prompt publication. Our field studies were begun on Milk River at Havre, Montana, and we examined the excellent exposures along that stream to the International Boundary, and beyond to Pendant d'Oreille Police Barracks, which is near one of Dawson's described localities, where the base of the Belly River beds is seen resting on the marine 'lower dark shales.' This is near Lake Pakowki of the maps, locally known as 'Badwater Lake.' We also examined the exposures of upper Belly River beds showing contact with the

* Published by permission of the Director, United States Geological Survey.

overlying 'Pierre shales' on Sage Creek, Canada, as described by Dawson and McConnell and continued our observations as far north as the Cypress Hills, where the top of the overlying marine Cretaceous is seen. Passing down Milk River below Havre and around the eastern end of the Bearpaw Mountains to Cow Creek and the Missouri River at Cow Island and thence up to Dog Creek, Judith, and Eagle Creek, Montana, we have studied the typical areas of the Judith River beds described by Meek and Hayden, and of the Eagle formation described by Weed.

We have become fully convinced that the Belly River beds are identical with the Judith River beds, as Dawson long ago suggested. Our conclusion is based on lithologic character, stratigraphic sequence, the vertebrate and invertebrate faunas of the beds themselves, as well as on the paleontology of the underlying and overlying beds in both Canada and Montana. We hope to present the evidence in full in a more formal paper within a few months.

Another important result of our work is the determination of the exact position which these beds occupy in the general Upper Cretaceous section of the west. For many years the Judith River beds have been generally assigned to the top of the Cretaceous and correlated with the Laramie, while the Belly River beds have been generally placed near the middle of the Upper Cretaceous, above the Benton and beneath the Pierre, though Dawson did not assert that they underlie all of the Pierre. We have found that the Judith River beds underlie about 600 feet of beds with the lithologic character and fauna of the Pierre, and that beneath them there is an equal thickness of marine beds that must also be correlated with the Pierre on account of the faunas they contain. Many of the invertebrate species from the beds underlying the Judith River have been described and figured as 'Fox Hills' species and supposed to come from beds overlying all of the Pierre.

On account of the differentiation of the beds representing the Pierre in this region into several formations, it is necessary to give new names to two of them which have not been previously recognized. For the dark clay shales with many calcareous concretions immediately overlying the Judith River beds we propose the name *Bearpaw shales,* since they are well developed around the northern, eastern and southern borders of the Bearpaw Mountains. They have the lithologic and faunal characters of the typical Pierre but represent only a fraction of that formation as generally understood.

Beneath the light-colored, mostly non-marine Judith River beds is another formation, 400 feet in thickness, which in its lower half resembles the Bearpaw shales and yields a few of the same species of fossils. Its upper 200 feet, however, contain several sandstone beds which bear a fauna that has hitherto been called 'Fox Hills.' We propose the name *Claggett formation* for these shales and sandstones underlying the Judith River beds. It is named for old Fort Claggett at the mouth of Judith River, in the neighborhood of which the formation is well developed.

Beneath the Claggett is the Eagle formation (named by Weed in the Fort Benton folio, Geologic Atlas of the U. S.) consisting of several heavy beds of coarse, light-colored sandstone, with clay shales and lignite, and having a total thickness of 250 to 350 feet. This also yields a marine fauna that has been referred to the 'Fox Hills' and is certainly more recent than any Benton or Niobrara fauna.

The Eagle formation rests on dark shales, which are known to include the Benton and probably the equivalent of the Niobrara.

The section may be summarized and compared with the sections in South Dakota, Colorado and elsewhere as follows:

		Ft.
Pierre	Bearpaw shales	600
	Judith River beds	500–600
	Claggett formation	400
	Eagle formation	250–300
Niobrara	Colorado shales.	
Benton		

J. B. Hatcher.
T. W. Stanton.

Judith, Montana,
July 11, 1903.

NOTES ON THE GEOLOGY OF LONG ISLAND.*

IN the investigation of the underground water resources of Long Island, which has recently been undertaken by the Division of Hydrology, U. S. Geological Survey, a number of new points have been developed which are of interest at this time. Among these are:

1. Proof of the absence of a uniform 'blue clay floor.'

2. The presence of deposits of an earlier ice advance which indicate old deeply buried channels extending 225 feet below sea level.

3. The presence of erosion remnants of a topography of pre-Pleistocene origin extending undisturbed to a height of at least 360 feet above sea level.

4. The considerable number of deep flowing wells on the north shore.

The idea that there is a fairly uniform bed of blue clay of probable Chesapeake Miocene age, which dips gently southward from its outcrop on the north shore has been demonstrated incorrect by well records obtained through the work of the Commission on Additional Water Supply, and from other sources. These have also indicated that that part of the clay bed which underlies the southwestern part of the island is Pleistocene since it is underlaid by glacial beds. Several clay beds of different age have evidently been connected in the attempt to get a clay bed having a stratigraphic unity.

The examination of well samples, particularly those from the test wells of the Brooklyn Water Works, has shown in the southern part of the island, west of Valley Stream, old glacial deposits lying unconformably on an old topography, and separated from the recent glacial material by thick beds of blue clay and sands not of recognizable glacial origin. In the western part of Brooklyn these older glacial beds have been found at a depth of 225 feet *below sea level,* and are believed to throw important light on the question of early Pleistocene elevation and subsequent submergence, as well as on the position of former stream valleys.

The last ice advance found a rather irregular topography and succeeded in covering the older hills with a veneer which is for the most part quite thin. Along the backbone of the island these deposits are much thinner than has been supposed, the really prominent portions of the ridge seeming to owe their prominence more to the preglacial hills than to morainic deposits. The most marked example of this is in the West Hills, lying in the center of the island, between Farmingdale, Melville, Cold Spring Harbor and Hicksville. Here there is a marked southward tongue of hills projecting from the east and west ridge. Glacial material covers the northward slope, and reaches a height of over 400 feet; but the southern portion of the ridge has not been covered with ice and is clearly not glacial. The following section just west of Melville indicates something of its structure.

SECTION JUST WEST OF MELVILLE, NEW YORK.

	Feet
Top of section about 300 feet A. T.	
1. Horizontally bedded yellow sand and quartz gravel with a few very much weathered compound pebbles. Near the upper part of the section the gravel is very bright orange	38
2. Covered	3
3. Dark-colored, lavender, green and black sandy clay, weathering yellow	6
4. Horizontally bedded, finely laminated, red arkose with a few rounded quartz pebbles. Weathering product of bed below	2.5
5. Horizontally bedded, finely laminated, green, white and pink arkose	3
6. Ferruginous sandstone	0.3
7. Yellow sand with ferruginous plates	0.5
8. Irregularly bedded, gray, clayey sand blotched with red and yellow becoming more sandy above and passing into a pink or red sand with lens-shaped masses of white clay	9.5
9. Covered	0.5
10. White clayey sand with large quartz gravel	2
11. Covered	1
12. Stratified orange-colored sandy clay with ferruginous plates	1

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13. Very black sand and gravel, probably stained with manganese dioxide..... 0.2
14. Coarse white sand and yellow clayey sand horizontally though rather irregularly bedded; the bedding lines being darker and rather more clayey than the rest.. 18

Mr. M. L. Fuller has found in the supposed morainic hills near Old Westbury, covered by only two feet of morainic deposits, gravel beds which are clearly of the same age as those capping the West Hills, a conclusion which is further supported by a rather complete series of samples from a well near this point obtained by Mr. Isaiah Bowman. Mr. Bowman has also found a section near the top of these hills which shows a very marked nonconformity between the thin coating of recent till and these underlying yellow- and orange-colored gravels. It is believed that the stratified gravel beds which Woodworth found capping Harbor Hill, near Roslyn (elevation 384 feet), belong to the same deposits, and that this hill is not of morainic origin.

Mr. Fuller has found a number of flat top terraces south of the moraine, which have something of the elevation of the Manhasset terraces north, suggesting their extension beneath the moraine.

At the heads of all the deep reentrant bays on the north shore there are many comparatively shallow flowing wells which seem to owe their origin to the steepness of the slope of the water table at these places, and to the difference in the resistance offered to the passage of water through the sands and through an open pipe, as well as to local clay beds. There are, however, a number of comparatively deep wells which are decidedly interesting in the face of the positive statement that a catchment area in Connecticut for wells on Long Island is impossible. Mr. Bowman has assisted in the collection of the following data regarding these wells:

Peacock Point.		
C. O. Gates	230 feet.	Elevation approximately 6 feet above high tide. Flows 30 gallons per minute.
C. O. Gates	210 "	Elevation approximately 10 feet. Flowed when first completed 40 gallons per minute. Is now being pumped.
C. O. Gates	225 "	Flows 10 gallons per minute.
W. D. Guthrie	340 "	Elevation about 10 feet. Flows 10 gallons per minute.
Mill Neck.		
Irving Cox	330 "	Elevation about 10 feet. Flows 72 gallons per minute.
Bayville.		
Dr. O. L. Jones	276 "	Flows.
Centre Island.		
A. K. Wetmore	318 "	Elevation approximately 3 feet. Flows 25 gallons per minute at high tide.
Colgate Hoyt	320 "	Elevation approximately 4 feet. Flows.
S. T. Shaw	292 "	Elevation approximately 5 feet. Flows 5 to 6 gallons at high tide. Flows slightly at low tide.
C. S. Sherman	351 "	Elevation approximately 4 feet. Flows 30 gallons at high tide, 20 at low tide.
G. M. Fletcher	370 "	Elevation approximately 10 feet. Flows 25 to 30 gallons at high tide.
G. C. MacKenzie	379 "	Elevation approximately 4 feet. Flows 75 gallons at high tide, 45 at low.
Lloyds Neck.		
Dr. O. L. Jones	248 "	Elevation approximately 5 feet. Flows 5 gallons at high tide.

Dip calculations based on data furnished by these wells give very uniform results showing a dip of about S. 23° E. sixty-five feet per mile, and as quite heavy clay beds have been found in all these wells overlying the water-bearing gravel, an insular source for this water seems almost impossible.

The investigations have hardly progressed far enough for very definite conclusions to have been reached regarding exact age and structural relations, but we hope that some of these points may be cleared up before the close of the season. A. C. Veatch.

THE KENT COUNTY, MICH., UPLAND PLANT SOCIETIES.

IT was with much interest that I read Mr. Livingston's contribution in the January, 1903, number of the *Botanical Gazette* upon the 'Distribution of the upland plant societies of Kent County, Mich.' I confess also to no little disappointment. My home is in Kent County, and several years of ecological study there have yielded me results that do not in all respects coincide with those contained in the article under review. I have not seen the author's more detailed account in the 'Report' of the Michigan Geological Survey for 1901, and perhaps some things that here seem obscure may there be made clear. In the first place Mr. Livingston's results appear to be based upon insufficient observation. The region chosen is too large, the flora too rich and complex, to allow of a thorough study in a single season. This manner of research, useful as it is in securing valuable data, is manifestly defective. Plant societies are not so simple as they appear at first sight. Subtle changes in soil, exposure and water-supply lead to corresponding changes in plant formations. A society in one region may appear distinct, while in reality it is but one phase of a larger society. Only a patient study of years of a local flora throughout all the seasons is of much worth, for only thus can a comprehensive and intelligent view of the prevalent conditions of plant life, as well as the character and actual constituents of the flora, be obtained.

Mr. Livingston has five primary plant societies: (1) The beech-maple, (2) the maple-elm-agrimony, (3) the oak-hickory, (4) the oak-hazel and (5) the oak-pine-sassafras societies. These seem hardly natural. The first two are very much nearer one another than the following three, and the third and fourth have a more intimate connection with each other than either has with the fifth.

Setting aside the strictly lowland societies, the sylvan element of the Kent County flora may well fall into four main types:

I. The elm-soft maple society of the river bottoms and other alluvial flats. *Ulmus americana, Acer dasycarpum* and *rubrum, Juglans cinerea, Platanus occidentalis, Salix nigra* and various other trees are present. Mr. Livingston has probably excluded much of this element because of its hydrophytic affinities, though his maple-elm-agrimony society corresponds to it in part. We may call this the bottoms-flora.

II. The beech-maple-basswood society of the timberlands. *Acer saccharum* and *nigrum, Fagus ferruginea, Tilia Americana, Fraxinus Americana* and *sambucifolia, Ulmus Americana* and several other trees are present. It has an herbaceous flora strictly its own. The soil is black and rich, and relatively moist. This includes Mr. Livingston's first and the greater part of his second society.

III. The oak-hickory-sassafras society of the oak-openings, having a great range of soils, being found in swamps, rich plains and valleys, as well as barren sands and clay hills. *Quercus bicolor* and *rubra* clothe the margins of swamps. *Quercus macrocarpa* and *Muhlenbergii* prefer the heavier clays, thus forming the bur-oak openings. *Quercus alba,* accompanied by the various black oaks, prefers the ordinary midland soils, though it is present throughout the entire range of the genus. *Quercus coccinea, velutina* and *imbricaria* prefer the drier soils, and with them is *rubra* (often) and *stellata* (rarely). The species of hickory show a like preference of soil. The flowering dogwood and the sassafras are also quite peculiar to the oak openings. In regions adjoining the timberlands the two floras merge somewhat into one another, though the oak flora is usually ascendant. In these forests, known as timberland openings, a rich fertile soil is present, perhaps the best of all our soils for agricultural purposes. Oaks are very rare in the true timberlands, but when present are usually of colossal size. Only *Quercus rubra* is at all frequent. Of hickories only *Carya amara* is common in the timberlands. *Juglans nigra* and *Prunus serotina* occur both in the timberlands and in the oak openings, but are now scarce except as shade trees in fields.

IV. The pine-hemlock-canoe-birch society of

the pine woods. This, as Mr. Livingston justly remarks, has disappeared in most places and has been supplanted by the flora of the lighter, drier oak openings. Only remnants of the true coniferous flora still remain, but *Epigæa repens, Gaultheria procumbens, Myrica asplenifolia* and the upland huckleberries and blueberries are still of occasional, or indeed locally of frequent, occurrence.

Of strictly mesophytic forest types we have then three, that of the beech and maple timberlands, that of the oak openings, and that of the pine woods. Of these the last is disappearing, and its remnants have, save in a few tracts of still standing pine, coalesced with the flora of the oak openings. In addition to the above, small tracts of almost pure birch are occasional, and in forests that have suffered most from fires a salicaceous type is often developed, consisting of various willows and our two aspen-poplars. Hawthorn glades, too, are of frequent occurrence, consisting mainly of species of *Cratægus, Pyrus coronaria* and various other shrubs.

Turning our attention now to details, we may well distrust the value of using common weeds, such as catnip, pokeweed, nightshade, spurges and even sand-burs as typical plants of native sylvan societies. These are plants capable of wide range of soils and conditions. They were not weeds else. Doubtless our common stick-tight (*Bidens frondosa*) is a hydrophyte, yet hardly is there any field where it is not too common. The sand-bur with us is a straggler from the sands of the Great Lakes, and is hardly indigenous except along our rivers. Now it is along all paths, roadsides and railroads. The common nightshade is a cosmopolite, and frequent everywhere.

As to the spurge, which is narrow-leaved or wide-leaved according to the society in which it grows, probably *Euphorbia corollata* is meant. I think that the width of the leaves varies with the age of the plants. In early summer, before the plant has branched, the cauline leaves are broad, but the later leaves, especially those on the branches, are much narrower. Nevertheless, the soil has also an influence on the robustness of this spurge, as it has on most species.

Dracocephalum parviflorum is given in the table as a frequent and characteristic plant of the beech-maple society. This plant I have never seen, and in the 'Flora of Michigan' published in the report of the Michigan Board of Agriculture for 1891, but three stations are given of this rare plant in the Lower Peninsula—Houghton Lake, Alcona County and Hubbardston. Perhaps it is locally abundant in portions of Kent County, and Mr. Livingston will oblige all students of the Michigan flora, if he will name exact localities.

Quercus ilicifolia similarly is given in the list as a frequent and characteristic plant of the oak-pine-sassafras society. It has not, to my knowledge, ever been reported before from any place in Michigan. According to all the manuals this oak is restricted to the Atlantic and Appalachian regions, not occurring west of portions of Ohio. It is hard to determine what oak has been confused with this strictly eastern species. The shingle oak, *Quercus imbricaria,* I have not seen north of the lower tier of counties in Michigan, though it is said to grow at Ann Arbor. The black jack, *Quercus marilandica,* is not known to occur certainly in Michigan, though it is mentioned in old lists as occurring in the extreme south. The species intended by *Quercus ilicifolia* is doubtless *Quercus coccinea,* or its variety *tinctoria,* in some of its scraggly dwarf forms.

The term *Quercus rubra coccinea* is neither exact nor scientific, as the two species are very easily separated by the mature fruit as well as by the buds. Only by those who judge the trees by the foliage at a distance are the two likely to be confused. Though they occasionally grow together, the red oak is oftener found at the margins of swamps and more rarely in the lighter soils. It, too, is occasional in the timberland forests. If the oak forest is to be divided as sharply as Mr. Livingston has divided it, the two must be separated.

The herbs given by Mr. Livingston as characteristic of the several plant societies are nearly all of the midsummer vegetation; his studies of the region quite likely took place then. Perhaps even better types could be chosen from the vernal species. Then, too,

the grasses and sedges appear not to have been studied at all, though these, next to the trees and shrubs, are the most important ecologically in most temperate regions. These omissions as well as the failure to distinguish sharply between related species—thus *Vitis cordifolia*, which is not known certainly to occur in Michigan, is confused with the very common *Vitis riparia*—and the failure also to discriminate between primary and secondary plant societies, detract seriously from the worth of Mr. Livingston's paper. The excellence of his treatment of the soils and the geological factors of the flora is thus marred somewhat by hurried and inexact observation of the flora itself. The ecologist must know his plants, or his work is worthless. He can not neglect any great group, not even the lower cryptogams, and give us a true conception of the actual plant life. He must stay with his flora till he knows it—he must see, if possible, the relation of each species with its environment, its relation too with its neighbor. If he can not cover a state or a county, let him be content with a township or a section. A broad plant survey has its uses; it has also its defects, but even so, such a survey should spring out of an intimate knowledge of local floras. A generalization not drawn from verified particulars is of no use to exact science.

FRANCIS DANIELS.

UNIVERSITY OF MISSOURI,
July 2, 1903.

DISCOVERY OF THE BREEDING AREA OF KIRTLAND'S WARBLER IN MICHIGAN.

ABOUT a month ago Mr. E. H. Frothingham, an assistant in this museum, and his friend, Mr. T. G. Gale, took an outing in Oscoda County, Michigan, and went prepared to secure specimens for the museum. On their return it was found that a male specimen of Kirtland's warbler (*Dendroica kirtlandi*) was among the bird skins which they had secured. This is one of the rarest and most interesting of North American birds, less than thirty specimens having been recorded from the United States and Canada. Mr. Frothingham has published a preliminary note of this June capture of a Kirtland warbler in the *Bulletin of the Michigan Ornithological Club*, Vol. IV. (Detroit). This is the first June record of the capture of this species. The late occurrence of this bird in northern Michigan and its relative abundance (several birds were seen and heard which were not taken) suggested that the bird was breeding in that region. In the hope of settling this point, as the breeding area of this bird was unknown, this museum sent its taxidermist, Mr. N. A. Wood, to Oscoda County to make a thorough investigation of this question and to secure specimens for the museum. Mr. Wood has just returned from this trip and has had excellent success as is shown by his having secured two nests with the young and one egg, thus establishing beyond question the breeding area of this species. A full account of the results of Messrs. Wood and Frothingham will soon be published. From an ornithological standpoint this is a very important discovery. In the *Auk* for October, 1898, Mr. F. M. Chapman writes concerning our knowledge of the North American warblers: "With the exception of several Mexican species just reaching our border, we can now write 'rare; nest and eggs unknown,' only of Kirtland's warbler." It is thus evident that this is a discovery of considerable interest.

Some unauthorized and incorrect reports have been made public, which makes it desirable to make this preliminary statement.

CHARLES C. ADAMS,
Curator.

UNIVERSITY MUSEUM,
UNIVERSITY OF MICHIGAN, ANN ARBOR.

CURRENT NOTES ON METEOROLOGY.

CLIMATE OF CAIRO.

IN 1859 the Khedive of Egypt ordered the reestablishment of the observatory which had existed at Bulaq from 1845 to 1850, but had then been closed. A site was selected and regular observations were commenced in 1868. The observatory is about three miles northeast of Cairo, on the edge of the desert, close to the military barracks of Abbassia. In 1889 Mr. J. Barois published a very

complete study of the climate of Cairo, using the observations made at the observatory for the twenty-one years, 1868–1888. Monthly bulletins were issued up to October, 1898, and in February, 1899, the observatory was transferred to the Survey Department, Public Works Ministry. In 1900 this department issued 'A Report on the Meteorological Observations made at the Abbassia Observatory, Cairo, during the years 1898 and 1899.' This report included the mean values derived from the observations of the previous thirty years, and was very fully illustrated by means of plates showing the mean daily and annual variations of the different weather elements. The work at the observatory has been carried on under the direction of Captain H. G. Lyons, R.E., Director-General of the Survey Department. Recently (1902) there has been issued a second 'Report on the Meteorological Observations made at the Abbassia Observatory, Cairo,' including the observations of the year 1900, together with the Alexandria means derived from the observations of the previous ten years. Eye readings made every three hours have been replaced by self-recording instruments. Meteorological stations have been established at Port Said, the Barrage, Assiut and Aswan. The diurnal and annual variations of the different weather elements are illustrated by means of numerous curves.

The Abbassia Observatory, and the cooperating stations, under the wise direction of Captain Lyons, are carrying on a valuable work in a country whose meteorology has always been of the greatest interest, and in which increasing numbers of Americans seek health during the winter months.

THUNDERSTORMS AND THE MOON.

In *Popular Astronomy* for June, Professor William H. Pickering summarizes some published statistics of thunderstorm occurrence in relation to the moon's phases, using data collected by Polis, van der Stok, Köppen, Hazen and others. The conclusion reached is that there really is a greater number of thunderstorms in the first half of the lunar month than in the last half, and also that the liability to storms is greatest between new moon and first quarter and least between full moon and last quarter. The difference is, however, not large enough to be of any practical importance.

RAIN AND DUST FALL IN EDINBURGH IN 1902.

In the *Quarterly Journal of the Royal Meteorological Society* (XXIX., 1903, p. 134) Dr. W. G. Black gives the results of his catch of dust and soot in the central district of Edinburgh during the year 1902. The fall of dust and soot in an open dish or gauge of 75 square inches amounted to 2 ounces, giving 3.8 ounces per square foot, or about 24 pounds for every 100 square feet.

R. DeC. Ward.

NEW YORK ZOOLOGICAL PARK.

The Zoological Society has recently received at the Zoological Park the following interesting animals, as reported by Director Hornaday: (1) A bear cub, six months old, collected at Port Muller Bay, Alaskan Peninsula, and evidently representing a species recently described as Merriam's Bear (*Ursus merriami*); this is probably the first specimen of its species to come into captivity. It is of a uniform bluish-gray color, quite different in appearance from all other bears that have thus far been received from Alaska by the Zoological Society. (2) Mr. Charles Sheldon has succeeded, after more than two years of constant effort, in securing a grizzly bear cub from Mexico. A fine young specimen, which, in spite of its black coat, is evidently a grizzly, arrived on July 15, from Mexico, as a gift from Mr. Sheldon. If this animal really is a grizzly, it represents the most southern form of that group of bears. (3) A Clouded Leopard (*Felis nebulosa*) was brought to the society by Captain Golding, from Singapore. This is a full-grown specimen, and at the proper time will be placed on exhibition in the Small Mammal House. (4) A fine half-grown specimen of the Siamang (*Hylobates syndactylus*), received from Captain Golding, is, in all probability, the first representative of its species to reach America alive. It is

a large black gibbon, with web fingers and a large air-sac, or pouch, under the throat. This specimen is in good health, and in zoological collections it even surpasses the gorilla in rarity. (5) A large and very fine specimen of the Tcheli Monkey (*Macacus tcheliensis*), of northern China, was also brought by Captain Golding. Its nearest relative is the Japanese red-faced monkey. Like the latter, it is a shaggy-haired and hardy animal. (6) A fine adult specimen of the Great White Heron (*Herodias egretta*), recently received from Miami, Florida, is probably the only captive representative of its species alive in North America. It was acquired by purchase, and reached the Park in perfect health. (7) Two specimens of the so-called 'Giant Bear' of Corea have been purchased by cable of Mr. Hagenbeck for one of the new bear dens, and will be shipped to the park very shortly.

H. F. O.

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*THE LISTER INSTITUTE.**

IN 1896, the centenary of Jenner's crucial experiment in proof of the efficacy of vaccination, a movement was started at St. George's Hospital to perpetuate his name by some suitable national memorial. It was decided that it should be associated with the then newly-established British Institute of Preventive Medicine, the form which it was to take being left to be determined by the Council of the Institute, according to the amount of money which might be raised. It was determined that if this amount should be so large as to place the funds of the Institute in a thoroughly satisfactory position, the name should be changed to the Jenner Institute; if the sum proved to be considerable, but less than enough for this purpose, it was to be applied to the endowment of a Jenner professorship, while if a still smaller amount were obtained it was to be devoted to founding a Jenner scholarship. The sum actually raised proved not more than adequate for the founding of a scholarship, but the Council of the Institute wishing to honor the pioneer of preventive medicine, resolved that the name of the institute should be changed. Afterwards, however, it was found that there already existed in London a commercial firm trading under the name of the Jenner Institute for calf lymph, and that it had a prior claim to the name of Jenner Institute. It was hoped, however, that as the Institute of Preventive Medicine was not preparing calf lymph, and in fact had agreed with the proprietor of the other institute not to do so while it retained a similar name, no confusion between the two would arise. This hope, however, was falsified as the two institutes were frequently supposed to be one and the same to the inconvenience of both. The mistake acquired additional probability from the fact that the local government board rented certain laboratories in the Jenner Institute of Preventive Medicine wherein the government staff prepared the lymph issued to public vaccinators. The governing body, finding the inconvenience so great, apart from the restriction mentioned above, and all efforts to meet the difficulty having failed, have determined again to change the name of the institute. The Jenner memorial committee has acquiesced with regret, and it has been agreed that its contribution shall remain invested in a Jenner memorial studentship in the institute under its new name. The governing body proposes that the institute shall in future be called the Lister Institute of Preventive Medicine. The name has, we are informed, been chosen against Lord Lister's own strong personal wish; but we believe that the profession and the public at large will agree with the governing body in thinking that no name could more appropriately be identified with the institute than that of the founder of antiseptic surgery. The proposed change has the approval of Lord Iveagh, whose munificent endowment of the institute was made just after the previous change had been effected; indeed, we are informed that it is no secret that, had it not been for that change, Lord Iveagh would then have suggested that the British Institute should be definitely associated with the name of Lister, as the similar institute in Paris is with the name of Pasteur.

* From the *British Medical Journal*.

SCIENTIFIC NOTES AND NEWS.

Rear Admiral George W. Melville, chief of the Bureau of Steam-engineering of the navy, retired from active service on August 8.

Professor E. C. Pickering, of Harvard College Observatory, has been given the degree of Doctor of Science and Mathematics by the University of Heidelberg on the occasion of the celebration of the centenary of its reopening.

Professor Carl Pearson, of University College, London, will give this year the Huxley memorial lecture, his subject being 'On the Inheritance in Man of Moral and Mental Characters and its Relation to the Inheritance of Physical Characters.'

Dr. A. G. Leonard, assistant state geologist of Iowa, has been elected state geologist of North Dakota.

Dr. Charles B. Hare, of the University of Michigan, has been appointed government bacteriologist in the Philippines.

The University of Edinburgh has conferred its honorary LL.D. on Professor S. S. Laurie, lately professor of education in the university, and on Sir Henry MacLaurin, chancellor of the University of Sydney, who has made various contributions to medical literature.

General A. W. Greely, chief of the Signal Service, represented the United States at the conference on Wireless Telegraphy, which met at Berlin on August 4, on the call of the emperor of Germany.

Professor Victor Goldschmidt, of the University of Heidelberg, the distinguished mineralogist and crystallographer, arrived in New York on the *Kurfürst,* on August 5, and will remain in this country until November. He will visit the Pacific coast and the Yellowstone Park, and be the guest of American mineralogists at Harvard University, Yale University, Columbia University, the Kingston (Can.) and Houghton (Mich.) Mining Schools, the University of Wisconsin and the Case School of Applied Science.

Dr. E. O. Hovey sailed for Europe on the *Moltke,* on August 6. He will represent the American Museum of Natural History at the International Geological Congress at Vienna, and afterwards will spend some time in the Puy de Dôme region of southern France.

Mr. Harlan I. Smith, assistant curator of archeology, is making investigations in the state of Washington for the American Museum of Natural History.

Mr. Adolph Hempel, an American engaged in scientific work in Brazil, recently shipped to the zoological laboratory of Harvard University several living specimens of *Cavia aperea,* the wild guinea-pig of Brazil. Three of the animals have reached Cambridge in safety and will be used in experimental studies in heredity.

The expedition of investigation sent to the Bahama Islands by the Baltimore Geographical Society returned on July 30.

The Antarctic relief ship *Terra Nova* is expected to proceed to Hobart, Tasmania, at the end of the present month by way of the Suez canal. She will there be joined by the *Morning.*

Professor J. A. Ewing, F.R.S., has been appointed a member of the Explosives Committee of the British government in the place of the late Sir W. C. Roberts Austen.

The Royal Society has awarded its Mackinnon research studentships to Mr. F. Horton in physics and to Mr. A. L. Embleton in biology.

Mr. W. E. Hartley, B.A., of Trinity College, has been appointed assistant observer in the Cambridge Observatory.

Dr. George R. Parkin, who recently visited the United States to make arrangements in regard to the Rhodes scholarships, is at present in South Africa on the same mission.

The plan of changing the name of the Jenner Institute of Preventive Medicine to the Lister Institute of Medicine, referred to elsewhere in this issue of Science, has been carried into effect by a unanimous vote of the members of the institution.

The centenary of the birth of C. C. J. Jacoby, the mathematician, occurs next year

and will be celebrated by the preparation of a memorial volume under the auspices of the third International Mathematical Congress and edited by Professor Königsberger.

Nature states that the monument which was unveiled last month at Bonn, in honor of Professor Kekulé, stands away from the city and just in front of the building of the chemical laboratories of the University of Bonn, the place in which Kekulé labored and taught for so many years and with such pronounced and conspicuous success. The statue stands on a granite pedestal, and is life-size and of bronze. On each side of the sculptured figure of Kekulé is a sphynx. The character of the man, simple and unpretentious yet convincing, is well brought out, and some of his greatest scientific achievements are clearly represented in relief on the pedestal. At the unveiling ceremony many universities and scientific bodies, foreign as well as German, were represented, and so also were numerous firms engaged in the chemical industry.

A BUST of the late Sir William Henry Flower, F.R.S., director of the Natural History Department of the British Museum, the work of Mr. Brock, R.A., was formally presented to the trustees of the British Museum by the Flower Memorial Committee, of which Lord Avebury is chairman, at the Natural History Museum, South Kensington, on July 25. Speeches were made by Professor Ray Lankester, Lord Avebury, Dr. Sclater and the Archbishop of Canterbury.

WE regret to record the death of Dr. W. C. Knight, professor of geology and mining engineering in the University of Wyoming, who died on July 8 from peritonitis after a brief illness.

DR. HAMILTON LANPHERE SMITH, professor of physics and astronomy in Hobart College, Geneva, N. Y. until 1890, died in New London on August 1, at the age of eighty-one years.

WE note with regret the death of Mr. William Earl Dodge which occurred at Bar Harbor on August 9. Mr. Dodge was one of the most public spirited citizens of New York City, who gave not only of his means, but also of his time to educational and scientific institutions. He was the first vice-president of the American Museum of Natural History and of the Metropolitan Museum of Arts; one of the trustees of the Carnegie Institution and of the New York Botanical Garden, and a member of the New York Academy of Sciences and of the American Geographical Society.

M. EDMOND NOCARD, the well-known student of comparative pathology, died at Paris on August 2.

M. RENARD, professor of mineralogy at the University of Genth, has died at the age of sixty years.

DR. FRANZ BAUER, docent for geology in the Technical Institute at Munich, died on June 21 as the result of an accident while on a geological expedition.

THE third International Mathematical Congress will be held at Heidelberg in August of next year. Professor A. Krazer, of Karlsruhe, is the secretary.

THE second International Seismological Conference was held at Strasburg at the end of last month with representatives in attendance from about twenty countries.

THERE will be a civil service examination on September 2 to fill a vacancy in the position of testing engineer (male) in the Bureau of Forestry, Department of Agriculture, at $1,200 to $1,500 per annum. On September 2 and 3 there will be an examination to fill the position of miscellaneous computer at the Naval Observatory, and on September 16 for the position of nautical expert in the hydrographic office, U. S. Navy, at a salary of $1,000.

MR. MARSHALL FIELD has written to the South Park Board of Chicago to say that he is willing to go forward with the building of the permanent Field Columbian Museum on the lake front as soon as the ground is ready for building. It is said that the cost of the building will be $6,000,000.

THE daily papers report that Mr. Andrew Carnegie has given U. S. Steel Corporation

Bonds of the par value of $2,500,000 to Dunfermline, Scotland, where he was born in 1837. The income is to be used for parks, a theater, the encouragement of technical education, etc.

THERE was a meeting of the British Cancer Research Fund on July 30, at which the prime minister presided and made an address. It was reported to the meeting that the fund now amounts to somewhat over £50,000, and that about £1,000 had been spent during the present year, some three thousand cases of cancer having been studied.

A FOREST reserve of 10,000 acres in Mifflin, Juniata and Huntingdon Counties in Pennsylvania has been recently created and named the Rothrock Forest Reserve, in honor of Dr. J. T. Rothrock, the present forest commissioner.

THE commission sent by the Marine Hospital Service to Vera Cruz, consisting of Dr. Herman B. Parker, of the Marine Hospital, and Drs. George E. Beyer and O. L. Pothier, of New Orleans, report three propositions as having been demonstrated beyond doubt, namely: 1. That the cause of yellow fever is an animal parasite, and not a vegetable germ or bacterium. 2. That the disease is communicated only by the bite of mosquitoes. 3. That only one genus of mosquitoes, *Stegomyia Fasciata,* is the host of the yellow fever parasite.

THE opening of the Simplon Tunnel in 1905 will be celebrated by an exposition at Milan, partly of international character. Special attention will be paid to exhibits of transportation by land and water and aerial navigation.

A REPORT has been widely circulated that a variety of basil (*ocinum viride*) possesses the property of driving away mosquitoes. Captain Larymore originally made the statement that several growing pots of this plant would keep a room free from mosquitoes, and that the leaves would stupefy them. Sir George Birdwood further reported that allied basils had long been used in India as a defense against mosquitoes and as a prophylactic in malarious districts. Experiments have now been made by Dr. W. T. Prout, principal medical officer in Sierra Leone, showing that mosquitoes flourish quite as well in the presence of basil plants as elsewhere. The efficacy of other plants reputed to drive away mosquitoes is no greater, and this should be generally known, in order that dependence may not be placed on empirical methods in place of proper means for the extermination of mosquitoes.

THE Board of Aldermen of New York City have authorized an additional bond sale to the amount of $188,000 for constructing approaches to a new wing of the American Museum of Natural History, for building a foyer to take the place of the old lecture hall and for other additions and improvements about the building. Among these additions will be two assembly-rooms for the use of the New York Academy of Sciences and for other scientific meetings. Ground is being broken on Manhattan Square, west of the new lecture hall, for the construction of an addition to the museum building to contain a thoroughly modern heating, lighting and power plant. It is planned to have the apparatus for the conversion and transmission of heat, light and power open to the public, and instructively labeled and described.

THE illustrated report to the U. S. Geological Survey on Precious Stones for 1902, by Mr. George F. Kunz, is now in press. The production of precious stone in this country in 1902 aggregated $318,300 in value, as compared with $289,050 in 1901, and with $333,170 in 1900. The total value of the precious stones imported into the United States during 1902 was $25,412,776, which sum was $550,209 more than that for the previous year, and twelve times the value of the importations in 1866.

THE Carnegie Trust for the Universities of Scotland has made the following awards under its research scheme: Research Fellowships, Chemical, (1) Charles E. Fawcitt, B.Sc. Edinburgh and London, Ph.D. Leipzig; (2) James C. Irvine, B.Sc., D.Sc. St. Andrews, Ph.D. Leipzig; (3) William Maitland, B.Sc. Aberdeen. Biological, (4) John Cameron, M.B., Ch.B. Edinburgh. Historical, (5) Duncan Mackenzie, M.A. Edinburgh, Ph.D. Vienna.

Research Scholarships, Physical, (1) J. H. Macyagan Wedderburn, M.A. Edinburgh; (2) Henry W. Malcolm, M.A. Aberdeen; (3) James R. Milne, B.Sc. Edinburgh; (4) Thomas B. Morley, B.Sc. (Engin.) Glasgow. Chemical, (5) Joseph Knox, B.Sc. Aberdeen; (6) John Johnston, B.Sc. St. Andrews; (7) Forsyth James Wilson, B.Sc. Edinburgh. Biological, (8) Sydney F. Ashby, B.Sc. (Agric.) Edinburgh; (9) Robert Thomson Leiper, M.B., Ch.B. Glasgow; (10) Henry J. Watt, M.A. Aberdeen. Pathological, Charles Todd Andrew, B.Sc., M.B., Ch.B., Aberdeen; Alexander Matheson, M.A., B.Sc., M.B., Ch.B., Glasgow; M. Logan Taylor, M.B., Ch.B., Glasgow; S. A. K. Wilson, M.A., M.B., Ch.B., B.Sc., Edinburgh. Historical, Alan O. Anderson, M.A., Edinburgh. Economical, John Young, M.A., St. Andrews. Linguistic, John Purves, M.A., Edinburgh. Research grants were also awarded to fifty applicants.

ACCORDING to the report to the United States Geological Survey for 1902 by Dr. Joseph Hyde Pratt, the production of crude tungsten ores during 1902 amounted to 183.5 tons, of which not more than a few tons were sold. The production of 1901 was 179 tons of concentrated ore, valued at $27,720. The larger part of the production of 1902 was from Colorado, with a smaller amount from Connecticut. No new localities were developed during 1902. Almost the entire production of commercial molybdenite was by the Crown Point Mining Company, of Seattle, Washington, from their property in the western part of Chelan County. The production amounted to about twelve tons. The value of the ores is very erratic, the prices quoted varying from $1,500 to $100 per ton. There was a marked increase in the production of uranium and vanadium minerals in 1902, which, as reported to the Survey, amounted to 3,810 tons, valued at $48,125, or $12.63 per ton. This, of course, represented the crude ore. In 1901 the production was 375 tons of crude ore. A portion of the uranium ore was treated, giving a concentrated product of 25 tons, which was valued at $8,000, or $320 per ton. Although it has been determined that these metals have beneficial effects when used in the manufacture of steel, considerable study of them is necessary before their commercial positions with respect to one another or to nickel and chromium can be definitely determined. Questions came up as to which of the various irons hardened by them are best adapted for steel drills, for dies and shoes in stamp mills, for car axles, carpenters' tools, etc., as to which will retain the best cutting edge, which will heat the least when in use and which will make the toughest iron. Mr. A. B. Frenzel, of Denver, Colorado, has offered prizes at a number of the schools of mines in the United States for investigations of these ferro-alloys in relation to the matters mentioned above.

A NEW division has been established in the Geological Survey, entitled the 'Division of Alaskan Mineral Resources,' which will embrace all of the investigations and surveys being carried on in Alaska. This division is coordinate with the others of the geologic branch of the survey and its chief will report to the director. For some years past extensive surveys and investigations have been systematically carried on in Alaska, the results of which have appeared in more than twenty publications of the Geological Survey, accompanied by extensive maps. These reports have been for the most part devoted to the discussion of the mineral resources of Alaska, and have proved of great practical benefit to prospectors and miners. This work is being pushed as rapidly as the appropriation will allow. The Alaskan division has now seven parties in the field, of which two are mapping and investigating the placers of the Nome region, two the gold deposits of the Yukon, another the coal-bearing rocks of the Yukon, the sixth is making a reconnaissance of the petroleum fields of Controller Bay and Cook Inlet, and the seventh is making a reconnaissance of the vein deposits of the Juneau and adjacent districts. Mr. Alfred H. Brooks has been made chief of the new division, with the official designation of geologist-in-charge, Division of Alaskan Mineral Resources. Mr. Brooks has been en-

gaged in Alaskan investigations for the last six years, during which time he has made many extensive journeys in the territory. He has had administrative control of the geologic work in Alaska for the last two years, and will now combine with this the charge of the topographic work. He leaves Washington about July 20, for an extended tour in Alaska, and will visit a number of the important mining districts in which investigations are being carried on.

THE *Deutsche Industrie Zeitung*, as abstracted in the Consular Reports, says that of all the countries producing steel in 1902 the United States led, with an output of 15,000,000 tons. These figures grow in importance when it is remembered that the world's production in 1894 was only 12,851,000 tons. Germany's production in 1902 was 7,780,000 tons, one-half that of the United States; while England's was only 5,000,000 tons, or one-third the production of the United States. The world's total steel output for 1902 was estimated at 35,000,000 tons. This would indicate a growth of 700 per cent. in twenty-two years, or an increase from a little more than 4,000,000 tons in 1880 to 35,000,000 tons in 1902. The great increase is due to the introduction and improvement of the processes, notably the flame furnace. Pennsylvania leads all parts of the world in the use of this furnace, followed by Illinois, New England, Ohio, etc. The steel produced by the Bessemer process during the last fifteen years was used mostly for rails. In England more than half of the steel produced by the Bessemer process went into rails. In Germany and the United States the proportion is not so large. While the United States produced 9,306,471 tons of steel ingots in 1902, it turned out only 2,876,293 tons of steel rails, or about 30 per cent. of the steel-ingot production. In Germany the amount of Bessemer steel put into rails is proportionately smaller. Because of the resisting power of the steel, the wear and tear on the rails is far less; but the manifold uses to which the steel can be put has taken away somewhat from the importance of steel-rail manufacture. The last twenty years has resulted in an age of steel. Three times as much steel is now produced as in 1894. The universal opinion seems to be that the production of steel is to go on increasing. If, during the next twenty years, the same rate of increase is maintained as marked the past, 1923 will see an advance of from 20,000,000 to 25,000,000 tons in the world's total production. In this enormous increase the United States, according to experts, is to play the important part. At the very least, this opinion seems reasonable. The United States now uses in a year 30,000,000 tons of the very best iron ore. In twenty years this would mean a total of 600,000,000 tons—possibly the exhaustion of the sources of supply.

UNIVERSITY AND EDUCATIONAL NEWS.

THE grounds of Clark University, Worcester, are to be surrounded by an ornamental wrought iron fence, estimated to cost at least $30,000, to be given by Mrs. Susan W. Clark, widow of the founder of the university.

THE London County Council has resolved, subject to certain conditions, to contribute £20,000 a year for the maintenance of the new Institute of Technology which it is proposed to establish in connection with the University of London.

THE University of St. Andrews has established a lectureship in geology with a salary of £300, the appointment to which will be made in September.

DR. CHARLES S. HOWE, professor of mathematics and astronomy in Case School of Applied Science, has been elected president.

PROFESSOR KENDRICK C. BABCOCK, assistant professor of history at the University of California, has been offered the presidency of the University of Arizona.

PROFESSOR J. A. EWING has resigned his chair of applied mechanics at Cambridge University which he has held since 1890.

DR. SIEVERS has been promoted to a newly-established chair of geography at the University of Giessen.